

REMARKS

By the *Office Action* of 9 March 2006 marked final, Claims 1-17 and 21 are pending in the Application, and all rejected. By the present *Response and Amendment After Final Rejection*, the Applicant amends Claims 1, 6, 13, and 21.

No new matter is believed introduced by the present *Response and Amendment After Final Rejection*. Significantly, Applicant's amended Claim 1 does not require a new search as no new elements are added but simply more clearly defined. It is respectfully requested that the present amendments be entered, and respectfully submitted that the present Application is in condition for allowance for the following reasons.

1. Rejection Of The Claims Under 35 USC § 112

Claims 1-11

The Examiner rejects Claims 1-11 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicant regards as the invention. Specifically, the Examiner states that "applicant should clarify what is intended by 'the actuator being integrated circuit compatible' in claim 1."

Applicant thanks the Examiner for the careful review of the Claims. The Examiner requested more specific structure in light of the previous amendment to Claim 1, and Applicant's current amendment to Claim 1 provides that structure. More specifically, Applicant amends Claim 1 to further define the structure associated with the actuator being integrated circuit compatible, namely, that the actuator and the integrated circuit be fabricated on the same single substrate. Amended Claim 1 now includes the limitation: "a single substrate upon which is fabricated a membrane, a membrane activating mechanism, and an integrated circuit." Therefore, the actuator of Claim 1 is integrated circuit compatible because the actuator is fabricated on the same single substrate as the integrated circuit.

The amendment to Claim 1 further clarifies the structure of the claimed invention without adding any new matter. Applicant's amendment to Claim 1 merely pulls the "integrated circuit" recitation from the preamble and inserts it into the body of the claim. Applicant submits that the amendment to Claim 1 places it in condition for allowance and does not present any new matter or new issues requiring further consideration and/or search. More specifically, none of the conditions set forth in MPEP §714.13 ("Amendments and Other Replies after Final Rejection") are met by the amendment to Claim 1:

- (A) the amendment does not fail to avoid any of the rejections but specifically addresses and overcomes the rejections set forth in the last *Office Action*,
- (B) the claims do not present any new matter, as all elements were previously recited in Claim 1,
- (C) the amended claim does not require further consideration or search, and
- (D) the amendment does not present additional claims.

In view of the clarifying amendment to Claim 1, Applicant respectfully submits that amended Claim 1, and its dependent Claims 2-11, are in condition for allowance.

Claim 13

The Examiner rejects 13 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicant regards as the invention. The Examiner states that “applicant should clarify what is intended by the ‘actuator being CMOS compatible’” in Claim 13.

Applicant respectfully traverses the rejection under 35 U.S.C. §112, second paragraph, because those of skill in the art fully appreciate and understand the ordinary meaning of the limitation “actuator being CMOS compatible.” Furthermore, the *Specification* provides an exhaustive and complete disclosure of what is meant by “actuator being CMOS compatible.” As fully set forth in Claim 13 and described in the *Specification*, the actuator must be fabricated on a single substrate to be “CMOS compatible.” Notably, the recited claim limitation does not rely on a general notion of “CMOS compatibility,” but requires that the actuator be CMOS compatible.

As provided in the *Specification*, the microvalves of the prior art were not CMOS compatible because they “involve bonding two wafers together to make the fluidic connection.” *Specification*, ¶ [0208]. As fully described in the *Specification*, “[t]he present invention overcomes this deficiency in the current art, and provides a microvalve 10 fabrication process that incorporates the microvalve 10 on the same wafer 160 as the fuel cell system to power up an integrated circuit (IC) that is also built on the same wafer 160.” *Specification*, ¶ [0208]. “Since the valve 10 is built on a single wafer 160 process, it is CMOS compatible.” *Specification*, ¶ [0208].

The *Specification* contains multiple descriptions of the single substrate structure required for an actuator to be CMOS compatible:

- “The invention is an improvement over the conventional miniature actuator, comprising a new design of microvalve that is robust, CMOS compatible, fully

fabricated by MEMS surface micro-machining on a single wafer process, low temperature operation, and inert/non-reactive to the working fluid in the valve environment.” *Specification*, ¶ [0084].

- “The fabrication processes can be entirely done by surface micro-machining and electroplating on a single wafer ... providing the potential of a CMOS-compatible process.” *Specification*, ¶ [0099].
- “The fabrication process of the present microvalve 10 is understandably challenging, as it preferably is CMOS compatible, and preferably fabricated fully on a single wafer 160.” *Specification*, ¶ [0238].
- “Such a process involves a wafer bonding that is undesirable for CMOS compatibility.” *Specification*, ¶ [0239]. “In the present invention, the fabrication process is done entirely of a single wafer 160.” *Specification*, ¶ [0240].

This description in the *Specification* fully delineates that the actuator must be fabricated on a single substrate to be CMOS compatible. Rejected Claim 13 expressly provides this limitation and requires that the actuator be fabricated on a single substrate. Therefore, Claim 13 is not in violation of 35 U.S.C. §112, second paragraph, and is allowable.

Despite the detailed disclosure in the *Specification*, Applicant amends Claim 13, in light of the Examiner’s rejections, to further clarify the structure required. The Examiner states that the Claim 13 limitation for “the actuator being CMOS compatible” does not provide any specific structural limitations. Applicant amends Claim 13 to further and more clearly define the structure of the claim and recite that it is the single substrate that is CMOS compatible. Therefore, amended Claim 13 now provides the recitation: “wherein the single substrate is CMOS compatible.” Therefore, the actuator of Claim 13 is CMOS compatible because the actuator is fabricated on a single substrate that is capable of CMOS processing.

Similar to Claim 1, the amendment to Claim 13 does present any new matter or new issues requiring further consideration and/or search as it simply clarifies a preexisting element of the claim. Furthermore, none of the conditions set forth in MPEP §714.13 are met by the amendment to Claim 13.

In view of the detailed disclosure in the *Specification* and the further clarifying amendments to Claim 13, Applicant respectfully submits that amended Claim 13 is in condition for allowance.

2. Rejection Of The Claims Under 35 USC § 102

The Examiner rejects Claim 1 under 35 U.S.C. §102(b), as being anticipated by Albarda et al. This ground of rejection is believed overcome by the clarifying amendments to Claim 1, namely that the present actuator is fabricated on the same single substrate as an integrated circuit. Thus, Claim 1 is allowable, and all claims depending on Claim 1, Claims 2-11, are also allowable.

3. Rejection Of The Claims Under 35 USC § 103

The Examiner rejects Claims 1-7 and 10-17 under 35 U.S.C. §103(a) as being obvious over Biegelsen et al. in view of Albarda et al. This ground of rejection is believed to be overcome in view of the clarifying amendments. Significantly, the Examiner states that Biegelsen et al. does not disclose a single substrate. If Biegelsen et al. does not teach a single substrate, then its combination with Albarda et al. cannot possibly overcome the lack of any disclosure or teachings in these references with respect to an actuator fabricated on a single substrate that is CMOS compatible. Furthermore, neither reference teaches an actuator fabricated on the same single substrate as an integrated circuit, as set forth in Claim 1.

The *Specification* fully discloses a number of the numerous benefits that result from a single substrate, CMOS compatible fabrication of an actuator. In addition to allowing for CMOS compatibility and integrated circuit compatibility, the single substrate fabrication enables, among other advancements, (i) the actuator to exhibit low power consumption, (ii) the actuator to be more reliable due to the lack of a need to bond and align the actuator, (iii) the actuator to be more stable as the actuator can remain latched without an induced electromagnetic force, and (iv) the actuator to exhibit fast response times due to the small overall mass of the actuator. *Specification*, ¶¶ [0083, 0110, 0112, 0184, 0209, 0286].

The Examiner states that it would have been obvious to one of ordinary skill in the art to use a single substrate to simply fabrication, however, the art is replete is references illustrating that low power, quick response time, and CMOS capability were unreachable prior to the present invention. Neither the cited references, nor their combination, teach what Applicant claims herein. Thus, Claims 1 and 12 are allowable, and all claims depending on Claims 1 and 12, Claims 2-11 and 13-17, are also allowable.

The Examiner rejects Claim 21 and further rejects Claims 8-9 and 14-17 under 35 U.S.C. §103(a) as being obvious over Biegelsen et al. in view of Roshen et al. The Examiner states that

Biegelsen et al. does not disclose a membrane being located between a permanent magnet and the electromagnetic force generator as required by Applicant's Claim 8.

Not only does Biegelsen et al. fail to show a membrane being located between a permanent magnet and the electromagnetic force generator, it also discloses a microvalve that requires the assembly of many layers necessitating alignment and bonding. [Biegelsen et al., figures 11 and 12]. Furthermore, Roshen et al. does not remedy the deficiencies of Biegelsen et al. Roshen et al. does not disclose an actuator fabricated on a single substrate. Roshen et al., in fact, discloses an actuator 10 that has a lid 30, to which a soft magnetic plate 28 is attached. [Roshen et al., Col. 1, l. 67 – Col. 2, l. 20]. None of the cited art provides motivation to provide what the Applicant claims herein.

Moreover, Applicant's disclosure regarding the limitations of Claims 8-9, 14-17, and 21 militate against a conclusion that they are obvious design choices. *See In re Gal*, 980 F.2d 717, 25 U.S.P.Q.2D (BNA) 1076 (Fed. Cir. 1992) (finding of "obvious design choice" precluded where the claimed structure and the function it performs are different from the prior art).

Nonetheless, as described above, this combination of references is believed overcome by the clarifying amendments herein.

4. Amendments to Claims 6 and 21

By the present *Response and Amendment After Final Rejection*, the Applicant amends Claims 6 and 21 to further clarify the claimed invention by providing that "the membrane is drawn into the first position." No new matter is believed to be introduced by these amendments.

5. Fees

No Claim fees are believed due. The number of Claims pending remains less than those filed.

No extension of time fees are believed due. Nonetheless, should any fees be due, authorization to charge deposit account No. 20-1507 is hereby given.

CONCLUSION

By the present *Response and Amendment After Final Rejection*, the Application has been in placed in full condition for allowance. Accordingly, Applicant respectfully requests early and favorable action. Should the Examiner have any further questions or reservations, the Examiner is invited to telephone the undersigned Attorney at 404.885.2773.

Respectfully submitted,

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8 May 2006

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